We claim:

1. A method of identifying protein sequences, comprising:

providing a protein sample;

providing a peroxycarbonate solution;

combining the protein sample and the peroxycarbonate solution to form a sample solution;

inserting the sample solution into a mass spectrometer;

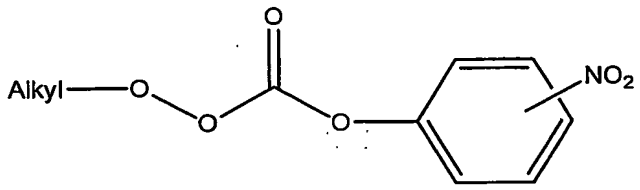
analyzing the mass spectrometer results using standard mass spectrometry procedures.

2. The method of claim 1, further comprising an incubation step after the combining step.

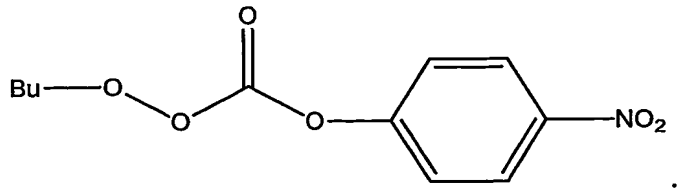
3. The method of claim 2, wherein the incubation step comprises incubating the sample solution at room temperature.

4. The method of claim 1, wherein the mass spectrometer is a Matrix Assisted Laser Desorption Ionization (MALDI) mass spectrometer.

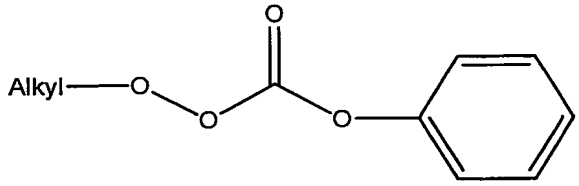
5. The method of claim 1, wherein the peroxycarbonate solution comprises the following compound:



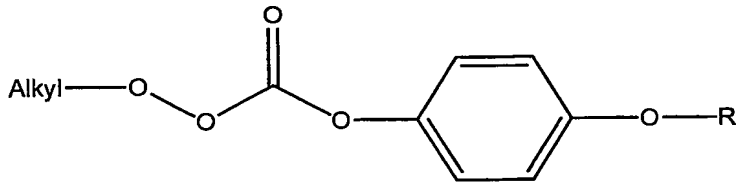
6. The method of claim 1, wherein the peroxycarbonate solution comprises the following compound:



7. The method of claim 1, wherein the peroxycarbonate solution comprises a compound selected from



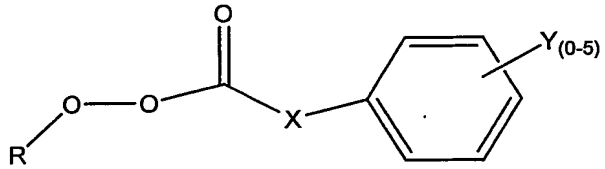
, and



,

wherein R is a substituent.

8. The method of claim 1, wherein the peroxycarbonate solution comprises a compound of the following formula:

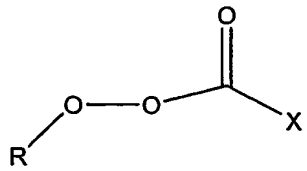


, wherein R is an alkyl group, X is a leaving group and the phenyl group, and each Y may be the same or different and hydrogen or a substituent.

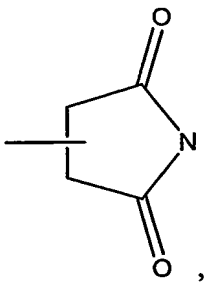
9. The method of claim 8, wherein X is O, S, or NH.

10. The method of claim 8, wherein Y is CN, OR, NO_2, CO_2H, CO_2R, halo.

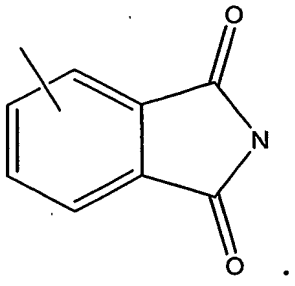
11. The method of claim 1, wherein the peroxycarbonate solution comprises a compound of the following formula:



wherein R is an alkyl group and X is an imidazole group, $-OCH_2CF_3$,

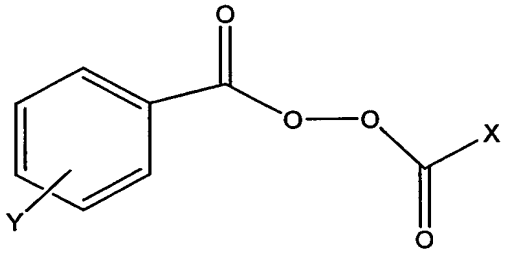


, or

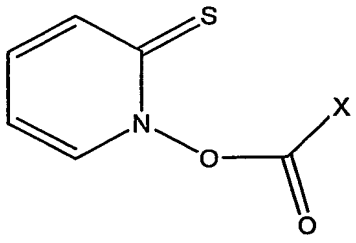


.

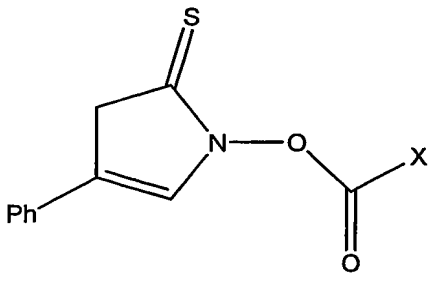
12. The method of claim 1, wherein the peroxycarbonate solution comprises a compound of the following formula:



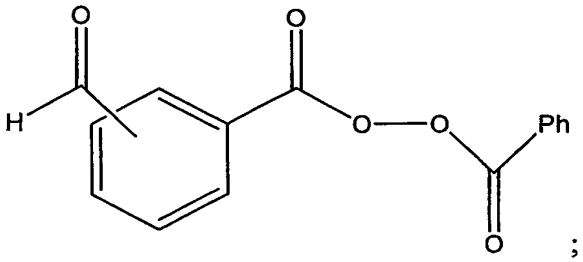
,



,



, or



;

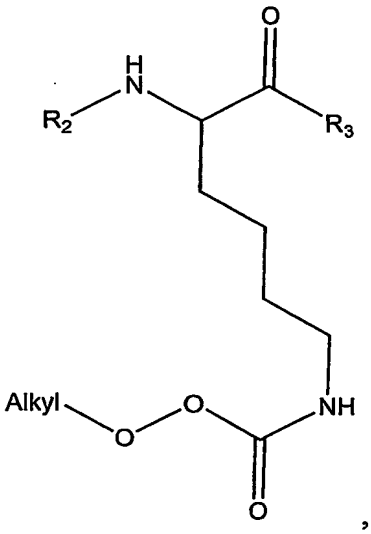
wherein X is a leaving group;

Y is CN, OR, NO_2, CO_2H, CO_2R, halo;

R is alkyl;

and Ph is substituted or unsubstituted phenyl.

13. A compound of the following formula:



,

wherein:

R_2 is $-CO-CH_3$ or a peptide;

R_3 is –NH-peptide or $-CO-O-CH_3$.

14. A solution comprising at least one lysine and a peroxycarbonate compound.

15. A solution comprising at least one protein, and a peroxycarbonate compound.

16. A solution comprising at least one amino acid, and a peroxycarbonate compound.

17. A method for directing fragmentation of peptides, comprising:

providing a peptide;

providing a peroxycarbonate solution;

introducing the peptide and/or peptide residue to the peroxycarbonate solution to form a peptide-peroxycarbonate solution.

18. The method of claim 17, wherein the peptide is in a solution that comprises a buffer.